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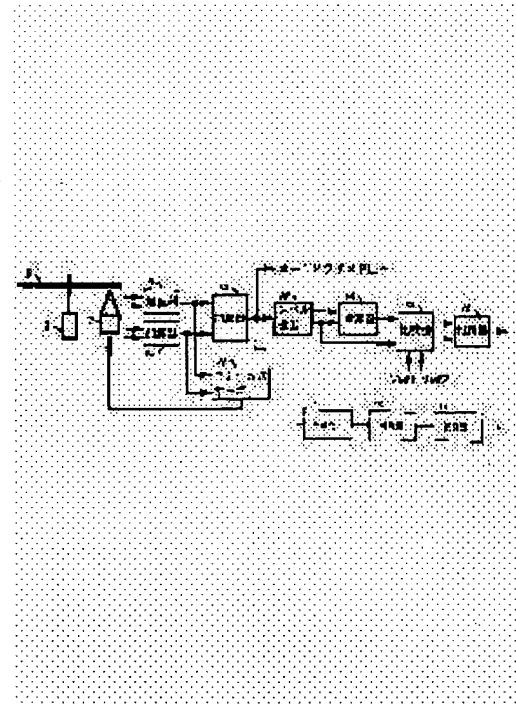
(54) DISK DISCRIMINATING METHOD AND DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To accurately discriminate plural kinds of disks having different recording formats of recorded signals respectively from an output of an optical pickup even in the case of optical recording media having about the same reflectivity such as the DVD(R) and the CD and also to surely discriminate whether a disk is a single layer or plural layers such as the single DVD and the dual DVD.

SOLUTION: In the disk discriminating method for discriminating plural disks 6 having different recording formats, the kind of the disk is discriminated by comparing a ratio of an output level of the max. amplitude of an HF signal obtained by rotating the disk 6 to the min. amplitude level with a 1st prescribed value.

Then, when the ratio of the max. amplitude output level of the HF signal to the min. amplitude level is larger than the 1st prescribed value, the kind of the disk is discriminated by the



number of crests or troughs of a focus error signal. Then, in this case, the kind of the disk 6 can also be discriminated by comparing the max. amplitude level with a 2nd prescribed value.

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CLAIMS

[Claim(s)]

[Claim 1] The disk distinction approach characterized by distinguishing the class of disk by comparing with a predetermined value the ratio of the output level of the maximum amplitude of HF signal and the minimum amplitude level obtained in the disk distinction approach which distinguishes the disk in a record format with which plurality differs when rotating a disk.

[Claim 2] In the disk distinction approach which distinguishes the disk in a record format with which plurality differs The ratio of the output level of the maximum amplitude of HF signal and the minimum amplitude level obtained when rotating a disk is compared with the 1st predetermined value. The disk distinction approach characterized by distinguishing the class of disk by comparing the above-mentioned maximum amplitude level with the 2nd predetermined value when the ratio of the output level of the maximum amplitude of HF signal and the minimum amplitude level is larger than the 1st predetermined value.

[Claim 3] The disk distinction equipment characterized by to have the pickup which reads the reflected light of a light beam, the level detector which detect the maximum-amplitude level and the minimum amplitude level of an output signal of the above-mentioned pickup, the divider which calculate the ratio of the above-mentioned maximum-amplitude level and the minimum amplitude level, and a comparator [a predetermined value / ratio / of the level concerned] in the disk distinction equipment which distinguishes the disk in a record format with which plurality differs, and to distinguish a disk with the output of the above-mentioned comparator.

[Claim 4] In the disk distinction equipment which distinguishes the disk in a record format with which plurality differs The pickup which reads the reflected light of a light beam, and the level detector which detects the maximum amplitude level and the minimum amplitude level of an output signal of the above-mentioned pickup, The divider which calculates the ratio of the above-mentioned maximum amplitude level and the minimum amplitude level, and the 1st comparator [the 1st predetermined value / ratio / of the level concerned], Disk distinction equipment characterized by having the 2nd comparator in comparison with the above-mentioned maximum amplitude level and the 2nd predetermined value, and distinguishing a disk with the output of the 1st comparator of the above, and the output of the 2nd comparator of the above.

[Claim 5] It is disk distinction equipment according to claim 3 which uses as a DVD disk and a CD disk the disk in a record format with which the above-mentioned plurality differs, and is characterized by the above-mentioned predetermined values being 0.3-0.6 to the maximum amplitude of a DVD single disk.

[Claim 6] It is disk distinction equipment according to claim 3 which uses as a DVD single disk and a DVD dual disk the disk in a record format with which the above-mentioned plurality differs, and is characterized by the above-mentioned predetermined values being 0.3-0.6 to the maximum amplitude of a DVD single disk.

[Claim 7] The disk distinction approach which is the distinction approach which distinguishes the disk of a monolayer or a double layer, and distinguishes a disk with the crest of the focal error signal of pickup, or the number of troughs.

[Claim 8] Disk distinction equipment characterized by distinguishing a record medium with the value which it set to the distinction equipment which distinguishes the disk of a monolayer or a double layer, and the objective lens of pickup was gone up or dropped, made binary the output signal of the pickup outputted at the time of the lifting concerned or descent, and carried out counting of the binary-ized signal concerned.

[Claim 9] In the disk distinction equipment which distinguishes the disk in a record format with which plurality differs The pickup which reads the reflected light of a light beam, and the level detector which detects the maximum amplitude level and the minimum amplitude level of an output signal of the above-mentioned pickup, The divider which calculates the ratio of the above-mentioned maximum amplitude level and the minimum amplitude level, and a comparator [a predetermined value / ratio / of the level concerned], The binary-ized circuit which makes the output signal of the above-mentioned pickup binary, and the counter which carries out counting of the output of the binary-ized circuit concerned, When it ****(ed) and is distinguished from the disk of the 1st class by the above-mentioned comparator, Disk distinction equipment characterized by distinguishing a record medium with the value which the objective lens of pickup was gone up or dropped, made binary the output signal of the pickup outputted at the time of the lifting concerned or descent, and carried out counting of the binary-ized signal concerned.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] This invention belongs to the technical field of the disk distinction which distinguishes the class of two or more kinds of disks with which record formats of the signal currently recorded differ mutually with the output of an optical pickup.

[0002]

[Description of the Prior Art] as the technique of carrying out distinction of for example, an optical mini disc (trademark) and a magnetic mini disc to the conventional technique which distinguishes two or more disks -- JP,5-128537,A -- moreover, there are some which are indicated by JP,6-267181,A as a technique of performing distinction of LD and R-LD (recorder bull LD).

[0003] The technique currently indicated by these is distinguished using the reflection factors of the light beam of record media, such as an optical disk, differing.

[0004] Drawing 1 is the block diagram of the equipment which performs disk distinction by the above-mentioned conventional approach. Pickup (1) irradiates a light beam at an optical disk (2), receives the reflected light, and outputs HF signal (3).

[0005] While this HF signal (3) is supplied to a demodulator, it is inputted into one input terminal of a comparator (4), and reference voltage Vref is inputted into the input terminal of another side.

[0006] Reference voltage Vref is a comparator (4) and it is set as the middle value of HF signal acquired by echo of each optical medium used as the object for distinction that it should distinguish as compared with HF signal (3) using the reflection factor of a light beam changing with classes of optical disk.

[0007] Therefore, with a distinction vessel (5), the class of disk can be distinguished by investigating the output of a comparator (4).

[0008] However, like a DVD disk and CD disk, when a reflection factor distinguishes the almost same disk, the allowable error of Vref becomes small and it becomes difficult to distinguish to accuracy by fluctuation of HF signal etc.

[0009]

[Problem(s) to be Solved by the Invention] This invention makes it a technical technical problem to be made in view of the above-mentioned situation, and to distinguish the class of the optical recording medium with the almost same reflection factor to accuracy, and to distinguish the class of one layer and two-layer optical recording medium to accuracy regardless of a reflection factor.

[0010]

[Means for Solving the Problem] This invention is characterized by distinguishing the class of disk by comparing with a predetermined value the ratio of the output level of the maximum amplitude of HF signal, and the minimum amplitude level obtained when rotating a disk in the disk distinction approach which distinguishes the disk in a record format with which plurality differs, in order to solve the above-mentioned technical problem.

[0011] Moreover, it sets to the disk distinction approach which distinguishes the disk in a record format with which plurality differs. The ratio of the output level of the maximum amplitude of HF signal and

the minimum amplitude level obtained when rotating a disk is compared with the 1st predetermined value. When the ratio of the output level of the maximum amplitude of HF signal and the minimum amplitude level is larger than the 1st predetermined value, it is characterized by distinguishing the class of disk by comparing the above-mentioned maximum amplitude level with the 2nd predetermined value.

[0012] Moreover, it is characterized by distinguishing the class of record medium with the value which made binary HF signal which is made to drive the objective lens of pickup and is acquired, and counted the signal concerned.

[0013]

[The gestalt of invention implementation] Hereafter, the embodiment of the disk distinction equipment concerning this invention is explained using drawing 2 - drawing 4. Drawing 2 is the block block diagram of the disk distinction equipment concerning this invention.

[0014] Among drawing, (6) is an optical recording medium used as the object for distinction, and it is aimed concrete at a DVD disk or CD disk.

[0015] (7) is pickup, a light beam is made to irradiate an optical recording medium (6), a quadrisection sensor detects the reflected light, and output signals A, B, C, and D are outputted from each division area.

[0016] (8) is a spindle motor and it carries out revolution actuation of the optical recording medium (6).

[0017] (9) and (10) are adders and they add the outputs A and C of an optical pickup, and B and D.

[0018] (11) is a focus servo circuit and performs focal control of an optical pickup (7) with an adder (9) and the output signal of (10).

[0019] (12) is an adder, adds an adder (9) and the output of (10), and outputs them as an HF signal.

[0020] (13) is a level detector, and detects and outputs the maximum amplitude level and the minimum amplitude level of an input signal.

[0021] (14) is a divider and calculates the ratio of the maximum amplitude level detected by the level detector (13), and the minimum amplitude level.

[0022] (15) is a comparator and compares the output of a divider (14) with a predetermined electrical potential difference.

[0023] (16) is a distinction machine, distinguishes the class of target record medium (6) with the value of the output of a comparator (15), and outputs the information corresponding to a record medium (6).

[0024] (17) is a binary-sized circuit, and it is changed into binary level while it removes a noise by hysteresis processing.

[0025] (18) is a counter and counts falling or the rising edge of an output of a binary-sized circuit (17).

[0026] (19) is a distinction machine and outputs the information corresponding to the output value of a counter (18).

[0027] Hereafter, the actuation which distinguishes an optical recording medium with above-mentioned disk distinction equipment is explained.

[0028] Moreover, by this example, distinction of a DVD disk and CD disk is performed, and when distinguished from a DVD disk, the case where the DVD disk (following and DVD single disk) of one more layer and a two-layer DVD single disk are distinguished is stated.

[0029] Distinction of this record medium is performed by rotating a disk in the condition of applying a focus servo and not applying a tracking servo.

[0030] Pickup (7) is that both a DVD disk and CD disk are also reproducible, and since it has composition used switching so that it may be suitable for each disk of pickup, the diameter of the beam spot changes it into the DVD disk playback condition which becomes small.

[0031] this condition -- the output signals A, B, C, and D from the quadrisection sensor of pickup (7) -- an adder (9) and (10) -- and (A+C) (B+D) becomes two kinds of signals.

[0032] An adder (12) is supplied while this signal is supplied to a focus servo circuit (11).

[0033] HF signal is outputted as an output of this adder (12). The wave of this HF signal is explained using drawing 3 and drawing 4.

[0034] Drawing 3 is drawing showing the locus on the disk of the beam spot when rotating a disk in the

condition of applying a focus servo and not applying a tracking servo.

[0035] Drawing 4 is the wave form chart of HF signal then acquired.

[0036] Since the beam spot (17) crosses a part (18) with a pit train, (19), (20), (21), and (22) according to causes, such as eccentricity of a disk, and it irradiates, HF signal serves as a wave from which the amplitude changes like drawing 4.

[0037] The ratio (Y/X) of the level X which is the maximum amplitude at this time, and the level Y which is the minimum amplitude, and the value of maximum amplitude X become as it is shown in a table 1.

[0038]

[A table 1]

	Y/X	X
DVD シングルディスク	0.6 ~ 0.7	1.0
DVD デュアルディスク	0.6 ~ 0.6	0.3 ~ 0.4
CDディスク	0.2 ~ 0.3	0.9 ~ 1.0

(最大振幅Xは、DVD シングルを 1.0 としたときの値)

[0039] The difference of the ratio (Y/X) of the level X which is maximum amplitude, and the level Y which is the minimum amplitude is produced when the track pitch P differs from 1.6 micrometers by 0.47 micrometers and CD disk with the DVD disk.

[0040] Moreover, the difference of the level X of maximum amplitude is produced when the reflection factors of a DVD dual disk are about about 1 of a DVD single disk and CD disk / 3.

[0041] As shown in this table 1, the level ratio (Y/X) of the maximum amplitude level X and the minimum amplitude level Y changes with classes of disk.

[0042] A disk is distinguished by the following signal processing using this.

[0043] HF signal which is the output of an adder (12) is supplied to a level detecting element (13) while it is supplied to an auto slice and the PLL section.

[0044] In a level detecting element (13), the level X which is the maximum amplitude of HF signal, and the level Y which is the minimum amplitude are detected, and the level values X and Y are supplied to a divider (14) and a comparator (15).

[0045] It asks for the level ratio (Y/X) of the level value X and the level value Y in a divider (16).

[0046] This level ratio is supplied to a comparator (15).

[0047] In a comparator (15), the comparison with a level ratio (Y/X) and the 1st reference value Vref1 is performed, and the result is supplied to a distinction machine (16) as the 1st comparison result.

[0048] Furthermore, the comparison with level X and the 2nd reference value Vref2 is performed, and the result is supplied to a distinction machine (16) as the 2nd comparison result.

[0049] With a distinction vessel (16), distinction of a DVD disk and CD disk is performed from the 1st above-mentioned comparison result.

[0050] Moreover, when a level ratio (Y/X) is larger than a reference value Vref1, namely, when it is distinguished from a DVD disk by this distinction, pickup is set as DVD mode, circuit system gain, such as gain of playback amplifier and a servo, is changed into the condition of being adapted for a two-layer disk, and distinction of a DVD single disk and a DVD dual disk is performed by the following approaches.

[0051] Since the regeneration level of the signal acquired from a two-layer disk is lower than one layer as changing into the condition of being adapted for this two-layer disk is shown in X of a table 1, it is the thing which raises gain that it should be amended and to perform for accumulating.

[0052] In this condition, if the objective lens of pickup is made to drive, since the focus of change (S curve) of the focal error signal to a two-layer disk suits to two layers, it will become the wave shown in drawing 5, and two crests (trough) of a repeat will be outputted.

[0053] The wave of this focal error signal wave (S curve) is made binary by the binary-ized circuit (17),

that output pulse is counted with a counter (18), and a distinction machine (19) performs distinction of a ~~DVD single and a DVD dual disk based on it~~

[0054] Here, when counted value is 2, it considers as a DVD dual disk, and when counted value is 1, it distinguishes from a DVD single disk.

[0055] By doing in this way, a DVD single disk and a DVD dual disk, and CD disk can be distinguished automatically.

[0056] In addition, what is necessary is just to set Vref1 as the value of 0.3-0.6, when the value of a reference value Vref1 sets the maximum amplitude of a DVD single disk to 1 from the property of each disk of Y/X shown in a table 1, and X.

[0057] moreover, a DVD single and DVD -- dual distinction can also be performed by the following approach.

[0058] That is, when a level ratio (Y/X) is larger than a reference value Vref1 (i.e., when distinguished from a DVD disk), the 2nd comparison result performs distinction of a DVD single disk and a DVD dual disk further.

[0059] By the 2nd comparison result, when level X is larger than a reference value Vref2, it distinguishes from a DVD single disk, and when small, it distinguishes from a DVD dual disk.

[0060] By doing in this way, a DVD single disk and a DVD dual disk, and CD disk can be distinguished automatically.

[0061] In addition, what is necessary is just to set Vref2 as the value of 0.4-1.0, when the value of Vref2 sets the maximum amplitude of a DVD single disk to 1 from the property of each disk of X shown in a table 1.

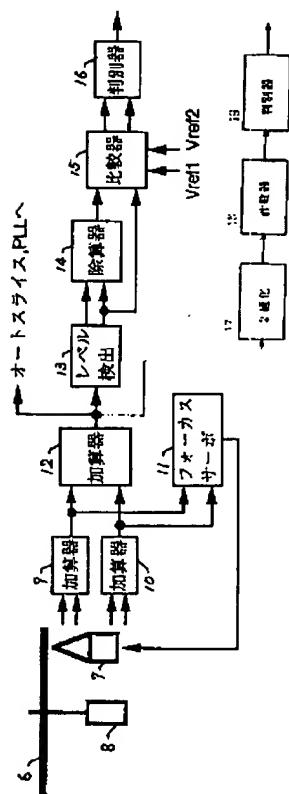
[0062] Then, according to an above-mentioned distinction result, it corresponds to the class of target disk and a DVD disk and pigeon CD mode take up change, selection of a digital disposal circuit, setting out of a servo constant, etc. (7).

[0063]

[Effect of the Invention] Since distinction of the almost same disk of a reflection factor can also be ensured like **** according to the disk distinction equipment of this invention, Automatic distinction of a disk can be ensured in the equipment which reproduces two or more record media, such as DVD and CD. Furthermore, distinction of a DVD single disk and a DVD dual disk can also be distinguished certainly, and target control and setting out according to a disk can be performed automatically, without troubling an operator's hand.

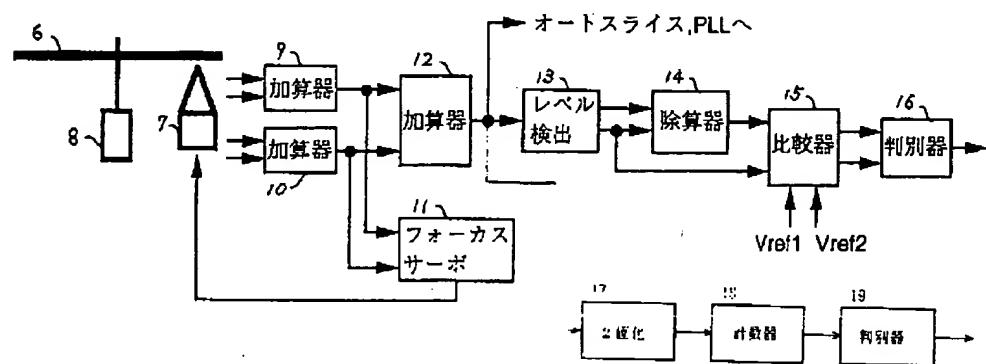
[Translation done.]

Drawing selection drawing 1



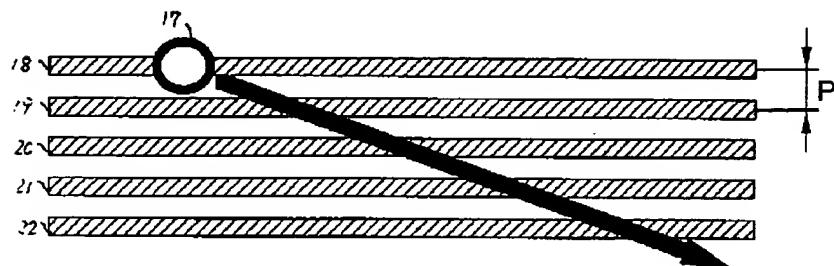
[Translation done.]

Drawing selection drawing 2



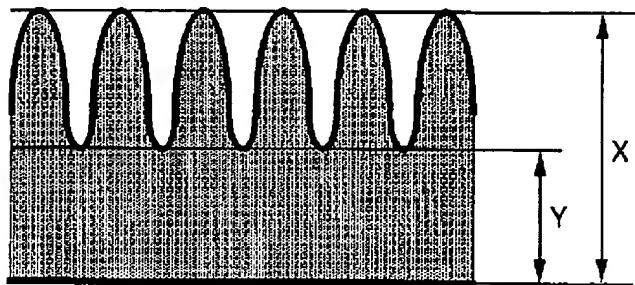
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Drawing selection drawing 3



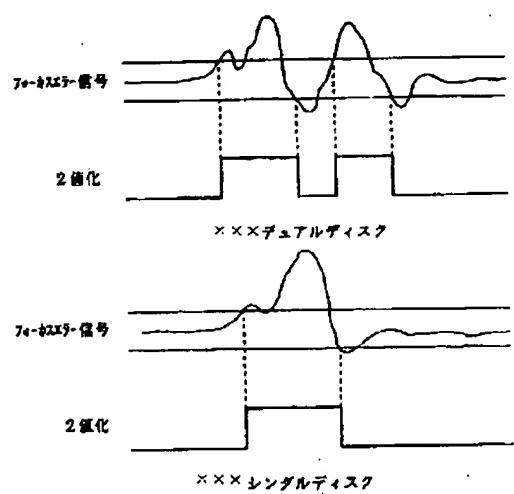
[Translation done.]

Drawing selection drawing 4



[Translation done.]

Drawing selection drawing 5



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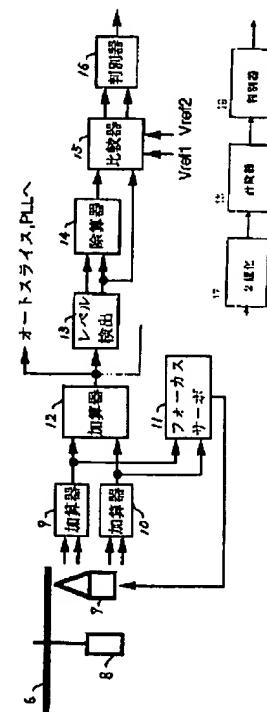
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(54)【発明の名称】 ディスク判別方法および装置

(57)【要約】

【課題】 記録されている信号の記録フォーマットが互いに異なる複数種類のディスクの種類を光ピックアップの出力により判別する際に、DVD (登録商標) ディスクとCDディスクのように、反射率がほぼ同じである光記録媒体であってもディスクの種類を正確に判別する。また、DVDシングルディスクとDVDデュアルディスクのように単層/複数層のディスク判別を確実に行う。

【解決手段】 複数の異なる記録フォーマットのディスクを判別するディスク判別方法において、ディスクを回転させたときに得られるHF信号の最大振幅の出力レベルと最小振幅レベルの比を第1の所定値と比較することでディスクの種類を判別する。また、HF信号の最大振幅の出力レベルと最小振幅レベルの比が第1の所定値よりも大きい場合は、フォーカスエラー信号の山または谷の数によりディスクの種類を判別する。また、この場合、最大振幅レベルを第2の所定値と比較することでディスクの種類を判別することも可能である。



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TITLE: DISK DISCRIMINATING METHOD AND DEVICE

----- KWIC -----

Abstract Text - FPAR (1):

PROBLEM TO BE SOLVED: To accurately discriminate plural kinds of disks having different recording formats of recorded signals respectively from an output of an optical pickup even in the case of optical recording media having about the same reflectivity such as the DVD(R) and the CD and also to surely discriminate whether a disk is a single layer or plural layers such as the single DVD and the dual DVD.